

Missouri Department of Natural Resources

## Total Maximum Daily Load Information Sheet

### Turkey Creek

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#### Water Body Segment at a Glance:

**County:** St. Francois  
**Nearby Cities:** Bonne Terre  
**Length of impaired segment:** 2.4 miles  
**Length of impairment within segment:** 2.4 miles (cadmium and lead)  
1.2 miles (zinc)  
**Pollutant:** Cadmium, Lead and Zinc in Water  
**Source:** Mill Tailings, Abandoned  
**Water Body ID:** 3282



State Map Showing Location of Watershed

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**Scheduled for TMDL development:** 2013

#### Description of the Problem

##### Designated beneficial uses of Turkey Creek

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Protection of Human Health (Fish Consumption)
- Whole Body Contact Recreation

##### Use that is impaired

- Protection of Warm Water Aquatic Life

##### Standards that apply

- Missouri Water Quality Standards found in 10 CSR 20-7.031, Table A, contains dissolved zinc, lead and cadmium criteria for the protection of aquatic life designated use. These criteria are hardness dependent and are calculated from the formulas shown below for chronic conditions<sup>1</sup> associated with classified water bodies:
  - Dissolved Cadmium  
$$e^{(0.7409 \cdot \ln(\text{hardness}) - 4.719948)} \cdot (1.101672 - (\ln(\text{hardness}) \cdot 0.041838)) = \mu\text{g/L, or micrograms per liter}$$

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<sup>1</sup> Chronic criteria apply to conditions producing adverse effects on aquatic life or wildlife following long-term exposure but having no readily observable effect over a short time period.

- Dissolved Lead  

$$e^{(1.273 \cdot \ln(\text{hardness}) - 4.704797)} \cdot (1.46203 - (\ln(\text{hardness}) \cdot 0.145712)) = \mu\text{g/L}$$
- Dissolved Zinc  

$$e^{(0.8473 \cdot \ln(\text{hardness}) + 0.785271)} \cdot 0.986 = \mu\text{g/L},$$

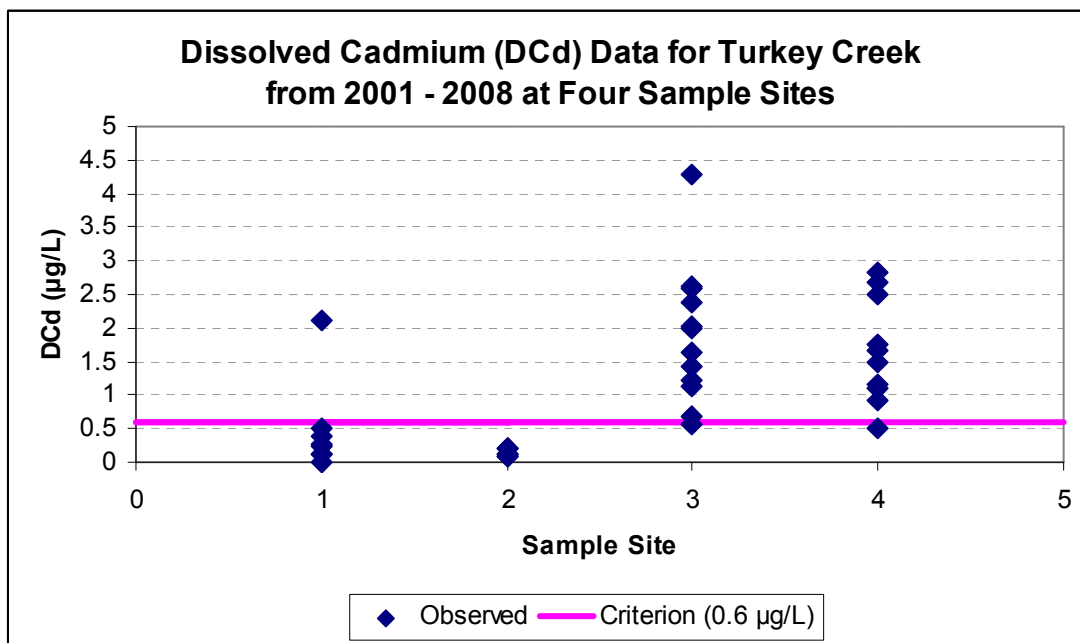
Using the hardness value of 358 (25<sup>th</sup> percentile of hardness data), the criteria for cadmium, lead and zinc are 0.6 µg/L, 9.77 µg/L and 315.4 µg/L respectively.

### **Background information and Water Quality Data**

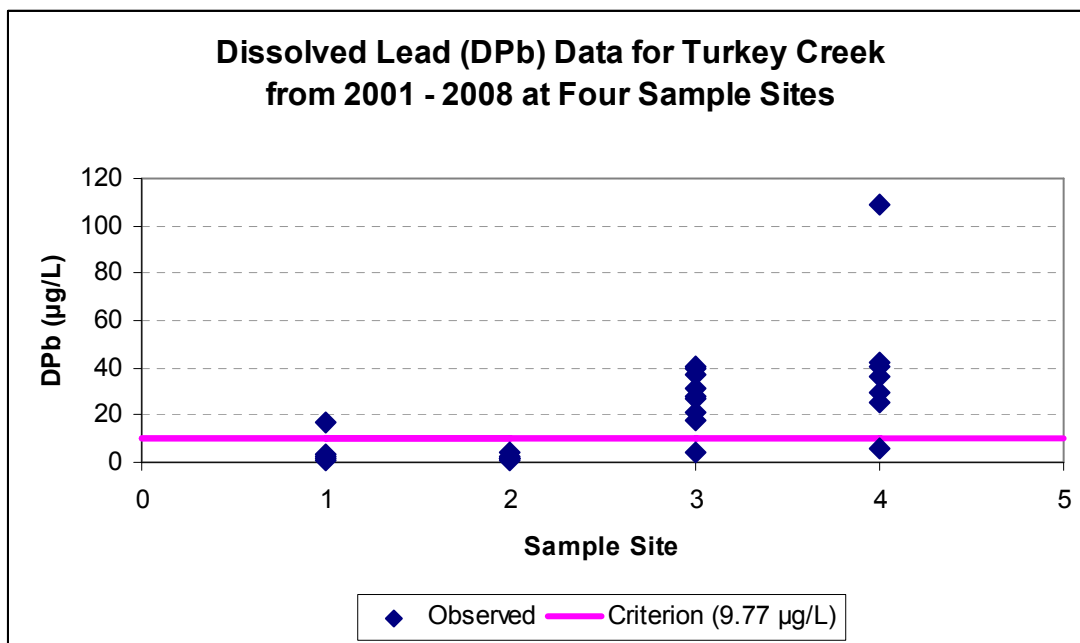
For nearly 150 years, the state of Missouri has been one of the world's largest producers of lead and zinc metals. Historically, lead and zinc ores were mined, milled by crushing and separation and transported to smelters throughout the state to be processed into raw metals. It is common to find lead and zinc contamination in soils, groundwater, surface water and sediments surrounding mines, mills and smelter sites and along haul roads.

Turkey Creek in St. Francois County is a small Ozark creek with its headwaters in the city of Bonne Terre and its mouth at Big River. The headwaters originate near large piles of tailings, or waste rock, left over from the extensive underground lead mining that occurred in the area for many years. Remedial action construction to stabilize the tailings against wind and water erosion and mass movement was completed in late 2003 for the western portion of the site. The eastern portion of the site was completed by 2007.

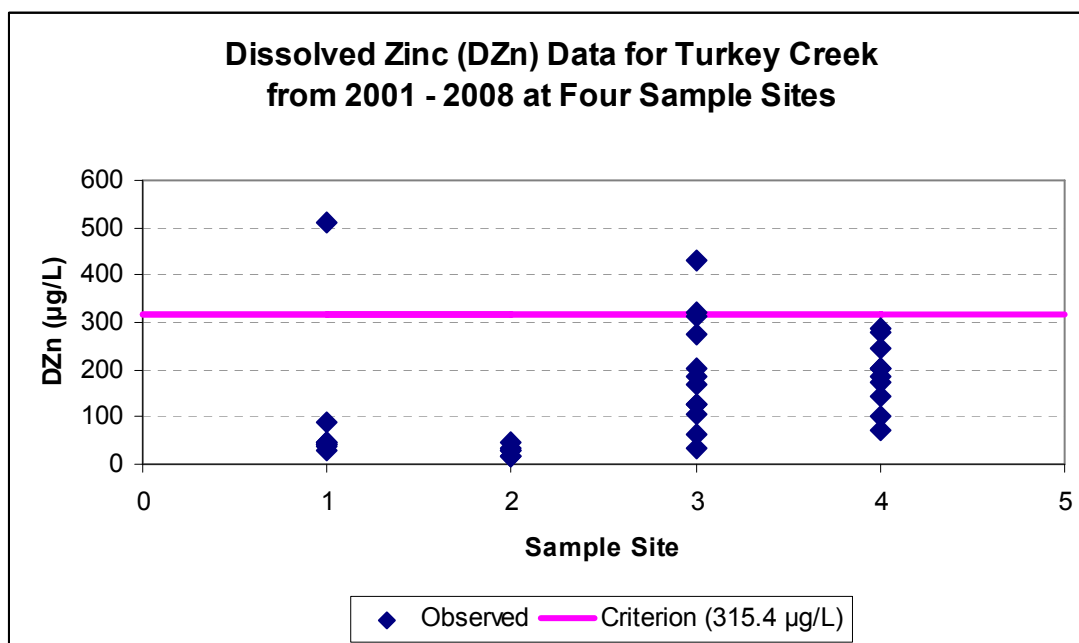
A water body is judged to be impaired by metals if chronic or acute numeric criteria are exceeded on more than one occasion during the last three years for which data is available. The water quality criteria for protection of aquatic life for dissolved metals depend on the hardness of the water. The department conducted water quality monitoring on Turkey Creek from 2001 to 2007 (Figures 1-3 below). There were six exceedences of chronic criteria for cadmium and lead and two for zinc in the last three years of data. Based on where these data were recorded, the whole creek is listed as impaired by dissolved cadmium and lead in the water column and the portion of the creek upstream of the Bonne Terre Wastewater Treatment Plant is judged to be impaired by dissolved zinc.



**Figure 1**

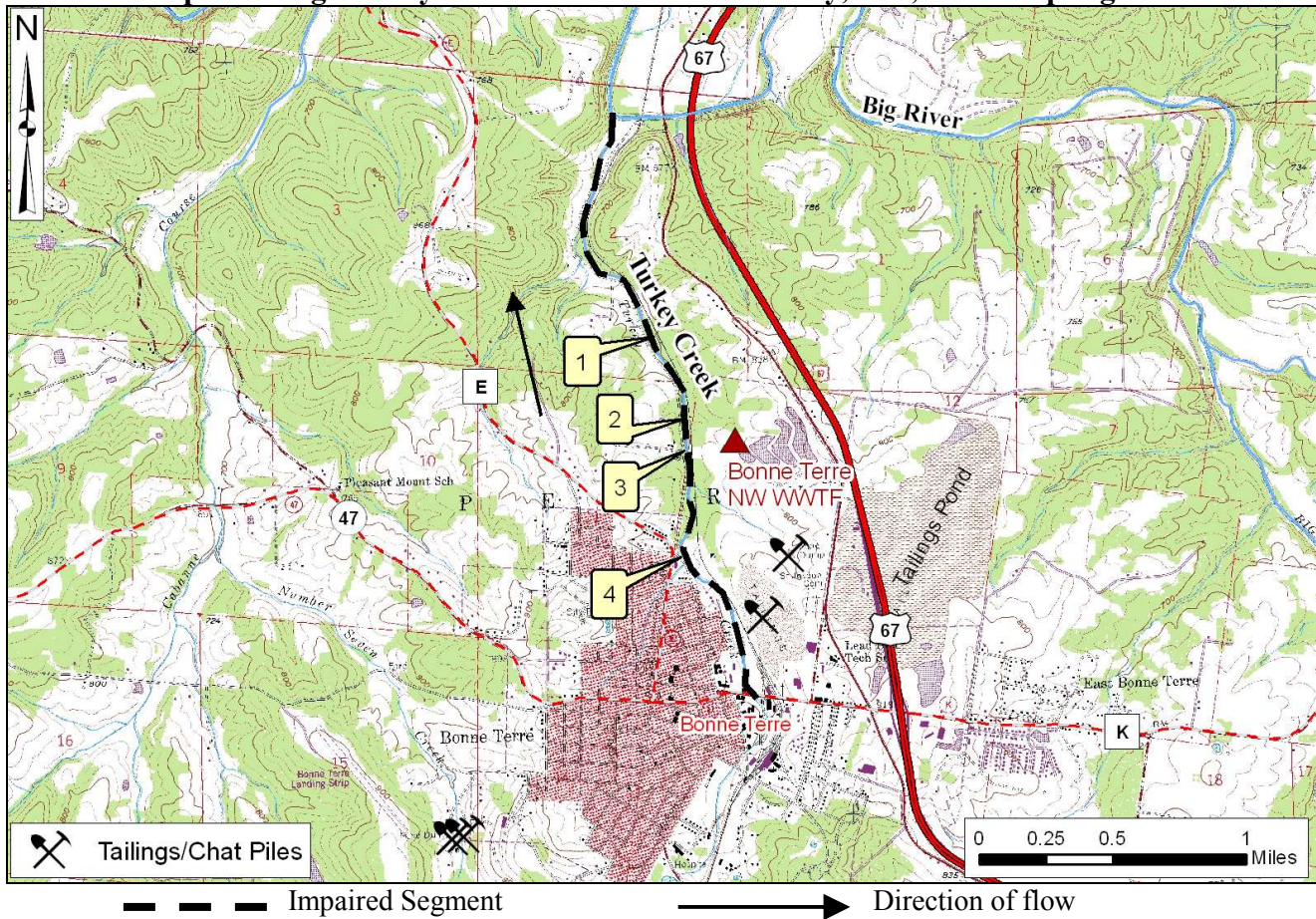


**Figure 2**



A map of Turkey Creek, showing the impaired segment and sampling sites, is on the next page.

**Map Showing Turkey Creek in St. Francois County, Mo., and Sampling Sites**



**Sample Sites**

- 1 – Trib2 to Turkey Cr. near mouth
- 2 – Trib from Bonne Terre WWTF\* near mouth
- 3 – Turkey Cr. bl. Chat pile & ab. WWTF trib.
- 4 – Turkey Cr. near Bonne Terre chat pile

\*WWTF = Wastewater Treatment Facility

**For more information call or write:**

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